U.S.C. §103(a) as unpatentable over Ishizawa in view of U.S. Patent 6,037,272 to Park et al. (hereafter Park). Applicant respectfully traverses the rejection.

In particular, Applicant submits that Ishizawa fails to suggest or disclose a semiconductor manufacturing method comprising at least the feature of transferring the substrate through a transfer chamber provided between a preliminary chamber and a process chamber, wherein the substrate transferring step comprises transferring the substrate from the preliminary chamber to the transfer chamber, holding in the transfer chamber the substrate transferred to the transfer chamber, and transferring the substrate from the transfer chamber to the process chamber, wherein an inert gas is supplied to and exhausted from at least the chamber in which the substrate is present among the three chambers at least during a period in which the substrate is present during the three steps of the substrate transferring step, as recited in claim 1, and similarly recited in claim 6.

The forgoing claim feature allows a gas flow in the exhaust direction to be formed within at least the chamber in which the substrate is present at least during the period in which the substrate is present during the three steps included in the substrate transferring step. Consequently, chemical contamination caused by reverse diffusion oil from a vacuum pump and trace amounts of volatility impurity components coming into the chamber structures can be reduced and/or ideally eliminated. Moreover, since by this method, chemical contamination can be prevented without using a turbo molecular pump, a transfer robot with which a super-high vacuum can be attained, metal O-rings, or other mitigation techniques, manufacturing costs can be reduced.

In contrast to the claimed invention, Ishizawa instead discloses a vacuum processing apparatus in which a wafer W is transferred from a vacuum process chamber 104a to a common transfer chamber 102, a gas within the common transfer chamber 102 is replaced and the wafer W is thereafter transferred from the common transfer chamber 102 to the vacuum process chamber 104b. In the structure of Ishizawa, when the gas within the

common transfer chamber 102 is replaced, an opening/closing valve 116 is closed to stop the gas supply to the common transfer chamber 102. The common transfer chamber 102 is then evacuated in this state with the valve 116 in this state. When the inner pressure of the common transfer chamber 102 is reduced to 0.5 Pa or less, the opening/closing valve 116 is opened to instantly supply the common transfer chamber 102 with an inert gas loaded in advance in a gas loading chamber 118, thereby boosting the inner pressure of the common transfer chamber 102.

However, in Ishizawa, when the gas within the common transfer chamber 102 is replaced, the supply of inert gas is stopped and only evacuation is conducted while the wafer W is present in the common transfer chamber 102. This means that the invention in Ishizawa does not supply gas to and exhaust gas from the chamber in which the wafer W is present simultaneously during the step corresponding to the second step of claim 1. Nowhere in Ishizawa is there suggestion or disclosure of this feature. Because Ishizawa does not maintain a flow of gas into and from the chamber, Ishizawa is incapable of effectively preventing chemical contamination due to reverse diffusion of contaminants. Thus, Applicant respectfully submits that claims 1 and 6 are patentable over Ishizawa. Dependent claims 4, 12 and 15 are likewise patentable over Ishizawa for at least the same reasons as claims 1 and 6 and for the additional features recited therein.

The Office Action relies upon Park to teach a process for making hemispherical grain layers on a wafer in the rejection of claim 5. However, Applicant respectfully submits that Park fails to supply the deficiencies of Ishizawa with respect to independent claim 1. Therefore, Applicant respectfully submits that claim 5 is patentable over the combination of applied references.

Regarding claims 2 and 13, Applicant respectfully submits that Ishizawa fails to suggest or disclose a semiconductor manufacturing method comprising a substrate transferring step in which an inert gas is supplied to and exhausted from all three of

preliminary, process and transfer chambers during the threes steps of substrate transferring, as recited in claim 2.

In contrast to the claimed invention, and as discussed above in the context of claims 1 and 6, Ishizawa teaches only evacuating gas from the common transfer chamber 102 while the wafer W is in the chamber and the supply of inert gas is stopped. In addition to the features of claim 1, claim 2 further recites that a gas flow is created in the exhaust direction in each of the three chambers during the three steps of substrate transferring. Ishizawa makes no suggestion or disclosure of this feature. Thus, Ishizawa is incapable of the enhanced contamination preventing qualities of the method of claim 2. Therefore, Applicant respectfully submits that claim 2 is patentable over Ishizawa. Dependent claim 13 is likewise patentable over claim Ishizawa for at least the same reasons as claim 2 and for the additional features recited therein.

Regarding claim 3, Applicant respectfully submits that Ishizawa fails to suggest or disclose a semiconductor manufacturing method comprising a substrate transferring step in which an inert gas is supplied to at least the chamber coupled to a vacuum pump among the three chambers and is exhausted from this chamber during the three steps of substrate transferring, as recited in claim 3.

In contrast to the claimed invention and as discussed above, Ishizawa fails to teach supplying gas to as well as exhausting gas from a chamber. Moreover, Ishizawa fails to contemplate that a gas flow in the exhaust direction can be formed in the exhausted chamber, thus effectively preventing contamination in the exhausted chamber. Therefore, Applicant respectfully submits that claim 3 is patentable over Ishizawa. Claim 14 is likewise patentable over Ishizawa for at least the same reasons as claim 3 and for the additional features recited therein.

Regarding new claim 9, Applicant respectfully submits that Ishizawa fails to suggest or disclose a substrate processing method comprising a substrate transferring step in which at

least one vacuum pump is coupled to the preliminary, transfer and process chambers, and in this vacuum pump, a gas flow from an upstream side to a downstream side of the vacuum pump is formed during the three steps of substrate transferring, as recited in claim 9.

In supplying and exhausting a gas to and from the chamber coupled to the vacuum pump when the gas flow from the upstream side to the downstream side of the vacuum pump is formed, gas flow is maintained both in the chamber itself and in the exhaust system. Consequently, contamination due to reverse diffusion is effectively limited and ideally prevented. Therefore, Applicant respectfully submits that claim 9 is patentable over Ishizawa.

Regarding claim 10, Applicant respectfully submits that Ishizawa fails to suggest or disclose a semiconductor manufacturing method comprising exchanging a substrate between a preliminary chamber and an external part, subjecting the substrate to predetermined processing in a process chamber and transferring the substrate through a transfer chamber provided between the preliminary chamber and the process chamber, wherein an inert gas is supplied and exhausted to and from the preliminary chamber during the substrate transferring step, as recited in claim 10. Therefore, Applicant submits that claim 10, as well as dependent claims 16 and 18 are patentable over Ishizawa.

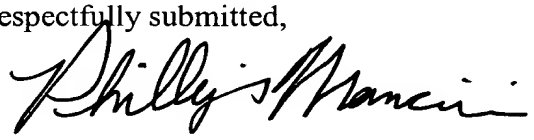
Regarding claim 11, Applicant respectfully submits that Ishizawa fails to suggest or disclose a semiconductor manufacturing method comprising transferring a substrate through a transfer chamber provided between a preliminary chamber and a process chamber, the method further comprising supplying and exhausting an inert gas to and from the preliminary chamber during a period in which the substrate is present within the preliminary chamber after the substrate is transferred into the preliminary chamber, as recited in claim 11. Therefore, Applicant submits that claims 11, as well as dependent claims 17 and 19 are patentable over Ishizawa.

In view of the forgoing distinctions, Applicant respectfully requests that the rejection of claims 1-4 and 6, under 35 U.S.C. §102(e), and the rejection of claim 5 under 35 U.S.C. §103(a), be withdrawn.

III. Conclusion

In view of the foregoing amendments and remarks, Applicant respectfully submits that this application is in condition for allowance. Favorable consideration and prompt allowance are earnestly solicited. Should the Examiner believe that anything further is desirable in order to place this application in better condition for allowance, the Examiner is requested to contact the Applicant's representative at the telephone number listed below.

Respectfully submitted,



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JAO:PDM/ccs

Attachments:
Appendix
Petition for Extension of Time
Amendment Transmittal

Date: April 7, 2003

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DEPOSIT ACCOUNT USE AUTHORIZATION
Please grant any extension necessary for entry;
Charge any fee due to our Deposit Account No. 15-0461

APPENDIX

Changes to Claims:

Claims 9-19 are added.

The following is a marked-up version of the amended claims:

1. (Amended) A semiconductor manufacturing method, comprising the steps of:

exchanging a substrate between a preliminary chamber and ~~the outside~~ an external part;

subjecting the substrate to ~~a~~ predetermined processing in a process chamber; and

transferring the substrate through a transfer chamber provided between said preliminary chamber and said process chamber, ~~and~~

wherein said substrate transferring step comprises the following three steps:

a first step of transferring said substrate, from said preliminary chamber to said transfer chamber;

a second step of holding in said transfer chamber said substrate transferred to said transfer chamber; and

a third step of transferring said substrate from said transfer chamber to said process chamber, and

~~supplying and exhausting~~ wherein an inert gas is supplied and exhausted to and from at least the chamber in which ~~the~~ said substrate is present among said three chambers at least during ~~the transfer of~~ a period in which said substrate is present during said three steps of said substrate transferring step.

2. (Amended) A semiconductor manufacturing method, comprising the steps of:

exchanging a substrate between a preliminary chamber and ~~the outside~~ an external part;

subjecting the substrate to ~~a~~ predetermined processing in a process chamber; and

transferring the substrate through a transfer chamber provided between said preliminary chamber and said process chamber, ~~and~~

wherein said substrate transferring step comprises the following three steps:

a first step of transferring said substrate from said preliminary chamber to said transfer chamber;

a second step of holding in said transfer chamber said substrate transferred to said transfer chamber; and

a third step of transferring said substrate from said transfer chamber to said process chamber; and

~~supplying and exhausting~~ wherein an inert gas is supplied and exhausted to and from all of said three chambers during ~~the transfer~~ said three steps of said substrate transferring step.

3. (Amended) A semiconductor manufacturing method, comprising the steps of:

exchanging a substrate between a preliminary chamber and ~~the outside~~ an external part;

subjecting the substrate to ~~a~~ predetermined processing in a process chamber; and

transferring the substrate through a transfer chamber provided between said preliminary chamber and said process chamber, ~~and~~

wherein said substrate transferring step comprises the following three steps:

a first step of transferring said substrate from said preliminary chamber to said transfer chamber;

a second step of holding in said transfer chamber said substrate transferred to said transfer chamber; and

a third step of transferring said substrate from said transfer chamber to said process chamber, and

~~supplying and exhausting~~ wherein an inert gas ~~to and from~~ is supplied to at least the chamber ~~equipped with~~ coupled to a vacuum pump among said three chambers and exhausted from this chamber using said vacuum pump during ~~the transfer~~ said three steps of said substrate transferring step.

6. (Amended) A substrate processing method, comprising the steps of:

exchanging a substrate between a preliminary chamber and an external part;

subjecting the substrate to ~~a~~ predetermined processing in a process chamber; and

transferring the substrate through a transfer chamber provided between said preliminary chamber and said process chamber, ~~and~~

wherein said substrate transferring step comprises the, following three steps:

a first step of transferring said substrate from said pre preliminary chamber n said transfer chamber;

a second step of holding in said transfer chamber said substrate transferred to said transfer chamber; and

a third step of transferring said substrate from said transfer chamber to said process chamber amber, and

~~supplying and exhausting~~ wherein an inert gas is supplied and exhausted to and from at least the chamber in which ~~the~~ said substrate is present among said three chambers at least during a period in which said substrate is present during ~~the transfer~~ said three steps of said substrate transferring step.